REMARKS

The specification has been amended to correct minor clerical errors. The claims have been amended to address the objections under 37 CFR 1.175 and the 112 rejections, and to better define the claimed invention. The abstract has been amended to conform to U.S. practice. No new matter has been entered by any of the foregoing amendments. Pursuant to 37 CFR 1.121, marked copies of the specification paragraphs, claims and abstract showing the changes made therein accompany this amendment.

It is noted the Examiner makes no mention of non-elected claims 11-13. These claims were never canceled. These claims were withdrawn from consideration, with the express reservation of right for rejoinder and/or for filing of a Divisional Application.

Before considering the art rejection, a brief review of the present claimed invention may be helpful to the Examiner. As noted in Applicants' specification, the basic idea of the invention, which goes contrary to usual concepts of those skilled in the art, involves a thin layer material consisting essentially of amorphous hafnium oxide having a density less than 8 gm/cm^3. As distinguished from the prior art, Applicants materials are deposited without the usual energy input, i.e. from ionic assistance or heating. In other words, the present claimed invention relates to a thin layer of hafnium oxide characterized by being in the amorphous form, and with a density lower than 8 gm/cm^3. The materials of the present invention provide significant advantages over prior art materials.

Applicants' independent claims 14 and 20 express the aforesaid inventive concept in two lines. Notwithstanding, the Examiner has found it necessary to daisy chain together four different prior art references in order to reject the claims as obvious. The Examiner's citation of

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four references in order to make out a two line claim by itself speaks to the non-obviousness of the claimed invention.

In rejecting the claims as obvious from Ando et al. in view of Floch et al. and further in view of Lazarov et al. and Oyama et al., the Examiner acknowledges that the primary reference Ando et al. fails to teach an amorphous hafnium oxide layer having a density less than 8 gm/cm^3 as required by Applicants' claims. However, the Examiner takes the position that this missing teaching is supplied by Lazarov et al. However, the Examiner's statement "Lazarov teaches material in amorphous form of a metal such as hafnium oxide that may have a density may be between 3.7 and 4.5 g/cm^3, meeting the Applicant's limitation of a density less than 8 g/cm^3. See col. 3, lines 30-39, 62-63 and col. 5, line 12", is just plain wrong!

In col. 3, lines 5-17 of Lazarov et al., it is stated that:

> "The material according to the present invention comprises compounds of one or more metals from group IV A of the periodic system, nitrogen and oxygen, in which case from 2 to 45%, preferably from 5 to 40%, very preferably from 10 to 28% of the volume are formed by voids (empty spaces) whose size lies in the range from $(0.5nm)^3$ to $(100nm)^3$. The remaining volume of the material (98-55%, preferably 95-60%) exhibits a composition of the group IV metal of the periodic system to nitrogen to oxygen of 1:(0.1 to 1.7) :(0.1 to 1.7). preferably 1:(0.25 to 1.5):(0.25 to 1.5). The material has the formula MN_xO_y, where "M" indicates the metal of group IV A of the periodic system and $_x$ or $_y$ the values 0.1 to 1.7...."

The material required in claim 14 is hafnium oxide, i.e. HfO_2. In the formulae of Lazarov et al. $_x$ is never equal to 0, and $_y$ is less than 1.7, i.e. never equal to 2. Thus, HfO_2 is only one of several compounds that fills the "remaining volume" of the material as stated in Lazarov et al., col. 3, lines 20-27.

Thus, Lazarov et al. does not teach a thin layer consisting essentially of amorphous hafnium oxide having a density less than 8 gm/cm^3 as required by Applicants' claims.

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Thus, no combination of the art applied by the Examiner reasonably could be said to achieve or render obvious Applicants' claimed invention.

Having dealt with the objections raised by the Examiner, it is believed the application is in order for allowance. Early and favorable action are respectfully requested.

In the event there are any fee deficiencies or additional fees are payable, please charge them (or credit any overpayment) to our Deposit Account Number 08-1391.

Respectfully submitted,

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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Assistant Commissioner of Patents & Trademarks , Washington, D.C. 20231 on December 4, 2002, at Tucson, Arizona.

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MARKED SPECIFICATION PARAGRAPHS

SERIAL NO. 09/830,380

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MARKED SPECIFICATION PARAGRAPHS SHOWING CHANGES MADE:

Sub-paragrapb beginning on page 14, line 15:

- [figure] Figure 3 between a layer of hafnium oxide comprising crystals of hafnium oxide resulting from ion bombardment of the substrate and an amorphous layer according to the invention.

Sub-paragraph beginning on page 14, line 23:

- Figure 5 is a curve representing the reflection of a mirror component of [figure] Figure 4 in function of wavelength.

Paragraph beginning on page 15, line 15:

Such [plotss] plots are shown in [figures] Figures 2 and 3.

Paragraph beginning on page 16, line 1:

On the other hand, [layers] curves 8, 9, 10 and 12 reveal diffraction peaks 13 characteristic of crystalline materials.

Paragrapb beginning on page 16, line 12:

A first embodiment example relates to the production of a mirror 4 at 1064 nm. The [component] mirror 4 must ensure a reflecting function at 1064 nm under an angle of incidence of 45°. This mirror 4 is produced by a stack of formula 12 (HB) H2B where H represents a mono-layer of thickness 156 nm of HfO_2 and B a mono-layer of 213 nm of SiO_2.

Paragraph beginning on page 16, line 19:

A cross-section of this optical [component] mirror 4 intended to represent the stacking of the layers is shown in [figure] Figure 4. On a substrate 1, the mirror according to the invention comprises first of all a stack of twelve layers H of amorphous hafnium oxide 2, each alternating with a layer B of silicon oxide 3. It then comprises two layers H of amorphous hafnium oxide 2 and finally a layer B of silicon oxide 3.

Paragraph beginning on page 18, line 15:

In [figure] Figure 6, the optical component 6 is shown, with the aim of simplification, with a single example of the two-layer composition comprising a layer of amorphous hafnia 2 alternating with a layer of silicon oxide 3.

Paragraph beginning on page 18, line 20:

The curve in [figure] Figure 7 shows the optical performance of component 6 in terms of percentage of light transmission in the working spectral range expressed in nm. It can be seen that the percentage is very close to 100% within the entire working range. The behaviour of this component under laser flux is shown to be excellent within the utilisation wavelength range.

MARKED ABSTRACT

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MARKED ABSTRACT SHOWING CHANGES MADE:

ABSTRACT

[THIN LAYER OF HAFNIUM OXIDE AND DEPOSIT PROCESS]

A thin layer of hafnium oxide or stacking of thin layers comprising hafnium oxide layers for producing surface treatments of optical components, or optical components, [characterised in that] in which at least one layer of hafnium oxide is in amorphous form [with] and has a density less than 8 gm/cm^3. [The invention also relates to a process for producing a layer of amorphous hafnium oxide on a substrate, characterised in that the deposit is carried out] The layer is formed by depositing on a substrate without energy input to the substrate.

[Figure 1]